Former Magna Metals
Sub-Slab Depressurization System Final Certification

Prepared for:

The New York State Department of Environmental Remediation

&

The New York State Department of Health
Bureau of Environemtal Exposeure Investigation

Prepared By:
Aztech Technologies Inc.
5 McCrea Hill Road
Ballston Spa, New York 12020
518-885-5383

Table of Contents

1. Introduction

1.1 Report Preface

The following report is intended to present pertinent information and data collected during the pre-design phase and post-installation phase of the sub-slab depressurization system (SSDS) located at the former Magna Metals site (the site) in Cortlandt Manor New York. The purpose of this report is to certify that the SSDS installed at the site is functioning properly and is protective of the occupant's public health. The content below is a combination of data obtained from public records, first hand site inspections and air sampling conducted by Aztech Technologies, Inc. (Aztech).

Aztech has prepared this report on behalf of the current property owner, Baker Capital, L.P. as requested by Nathan Walz of the New York State Department of Health's Bureau of Environmental Exposure Investigation.

1.2 Site Background

Located at 510 Furnace Dock Road, the site operated as a metal plating facility from 1955 through 1979. Currently located on the property are a warehouse building and an attached office/laboratory. Both areas of the structure are currently occupied by privately owned companies.

Due to the metal plating operations and associated contamination that took place at the site, the NYSDEC has classified the site as a Class 2 under the State Superfund Program. A Class 2 site is known to contain hazardous waste or other components such as breakdown products that represent a significant threat to the environment or public health.

Historically the operations that took place on site by Magna Metals included the discharging of iron, lead, copper, nickel, zinc, chlorides, cyanides, and sulfates into a series of leaching pits located on the property. In addition to the metals discharged directly onto the ground surface of the site, Trichloroethene (TCE) was allegedly discharged into the septic system on the property. Other volatile organic compounds (VOCs) were detected in groundwater and soil samples during the Remedial Investigation (RI). These VOCs have the potential to migrate through the groundwater across a site and volatize into voids of the soil creating vapors under a structure or dwelling. The vapors penetrate through the porous concrete slab of the structure and into the ambient air of the occupied space. Over time these vapors can have negative effects on the health of the public living or working in that structure or dwelling.

1.3 Scope of Work

The remedy chosen to assist in mitigating the soil vapor intrusion of TCE into the office building on the site included the design and installation of a sub-slab depressurization system (SSDS) by an experienced remedial contractor. Aztech was contracted by the current property owner, Baker Capital Limited Partnership to perform the design and installation of the SSDS.

The SSDS installed is capable of extracting soil vapors from underneath the slab of the laboratory/office space of the building and discharging those vapors above the roofline into the atmosphere. Design of the system included a calculated theoretical discharge concentration to determine if vapor phase carbon treatment is required by regulatory standards. Discussion of these calculations and final confirmatory testing can be found in the following sections.

2. Pre-Installation

2.1 Preliminary Air Quality Sampling and Analysis

As part of the State Superfund Program, sub-slab soil vapor and indoor ambient air samples were collected every year inside of the building during the heating seasons from 2007 through 2011. Laboratory analysis for VOCs was conducted using Method TO-15 with a detection limit of 1 $\mu g/m^3$. Analysis of the soil vapor and indoor air confirmed that soil vapors were penetrating the slab of the laboratory/office building on site. The compound TCE was identified each year in every sample collected. Over time the concentrations of TCE generally increased from the previous year. In 2011 concentrations of TCE were identified at 65,000 $\mu g/m^3$ and 5.4 $\mu g/m^3$ in the sub-slab soil vapor and indoor air samples respectively. Due to the increasing concentrations of TCE identified inside of the office building, the decision was made to take action to reduce the infiltration of VOCs in order to protect the health of the building occupants.

2.2 Pre-Design Radius of Influence Communication Testing

Prior to the initiating the design process, Aztech mobilized to the site to conduct sub-slab communication testing. This served as a way to determine the amount of vacuum pressure that can pass through the sub-slab soil over a measured distance. From these tests, the radius of influence an extraction well is capable of mitigating can be determined based on the applied vacuum of the system fan. The sub-slab communication test was conducted by Aztech personnel on October 11, 2011 using a 1.5 HP Rotron blower fan and digital manometer. The test results concluded that the system design would require a fan that would draw a minimum vacuum of five inches of water column at each extraction well to accomplish a flow rate of 10.25 CFM. This would achieve adequate communication over a distance of approximately 30 ft from each of the extraction wells.

2.3 Pre-Installation Communication Test Results

Time	Extraction Point Number: EW1									
	Fan Model: 1.5 HP Rotron Blower									
	Vacuum at Well Head	Vacuum at Point #1	Distance from Well Head to #1	Vacuum at Point #2	Distance from Well Head to #2	Vacuum at Point #3	Distance from Well Head to #3	Vacuum at Point #4	Distance from Well Head to #4	Air Flow (F/M)
2015	60"	n/a	8'	0.125	36'	0.005	48'	0.062	27'	1546
2030	35"	1.646	8'	0.022	36'	0.005	48'	0.038	27'	1037
2045	15"	0.659	8'	0.022	36'	0.000	48'	0.013	27'	624
	5"	0.200	8'	0.012	36'	0.000	48'	0.004	27'	474

Time	Extraction Point Number: EW2													
	Fan Model: 1.5 HP Rotron Blower													
	Vacuum at Well Head	Vacuum at Point #1	Distance from Well Head to #1	Vacuum at Point #2	Distance from Well Head to #2	Vacuum at Point #3	Distance from Well Head to #3	Vacuum at Point #4	Distance from Well Head to #4	Vacuum at Point #5	Distance from Well Head to #5	Vacuum at Point #6	Distance from Well Head to #6	Air Flow (F/M)
2300	60"	0.264	10'	0.027	20'	0.035	30'	0.031	40'	0.000	50'	0.000	20'	1003
2315	35"	0.239	10'	0.017	20'	0.027	30'	0.022	40'	0.000	50'	0.000	20'	728
2330	15"	0.138	10'	0.009	20'	0.015	30'	0.012	40'	0.000	50'	0.000	20'	604
2345	5"	0.049	10'	0.004	20'	0.005	30'	0.004	40'	0.000	50'	0.000	20'	425

2.4 Sub-Slab Depressurization System Design

Communication test data and physical site characteristics were entered into the New York State Department of Environmental Conservation's (NYSDEC) Air Guide 1 effluent formulation software program. The ratio of weight to volume of the contaminant of concern, TCE, determined during initial sub-slab vapor analysis was also inputted into the software program. Other required site characteristics and parameters such as geographic location and site zoning were taken into account and used by the software to generate an estimated annual effluent concentration. That theoretical effluent concentration was compared to the Annual Guideline Concentration (AGC) for TCE dictated by the NYSDEC. Based on the projected annual effluent concentration, the system design, and effluent stack height chosen, the system, as designed, is allowed to discharge into the atmosphere without flowing through a vapor phase carbon treatment system.

Aztech designed a SSDS that consists of three (3) soil vapor extraction fans that provide soil vapor mitigation throughout the office space of the building as well as a portion of the loading dock area shared by the adjacent warehouse. The system utilizes six (6) sub-slab extraction wells installed to a depth of approximately 12 to 18 inches below the bottom of the existing structural slab. Adjacent extraction points are paired together and piped to one of the three (3) high suction Radon-Away™ fans located on the roof of the office building.

3. Post Installation

3.1 SSDS Installation

On November 14th 2011, Aztech mobilized a crew of experienced technicians and materials to the site. All extraction wells and lateral plumbing was installed using three-inch (3") Schedule 40 polyvinyl chloride (PVC) pipe and hung above the drop ceiling in the office areas. Each extraction well penetrated the concrete slab and was set at a depth 12-18 inches below the slab. Extraction wells were backfilled with crushed granular stone to allow for an even flow of soil vapor from all directions. A layer of non-shrink grout was placed on top of the stone to ensure a tight seal around the base of the well level with the top of the existing concrete slab. Pairs of adjacent extraction wells were plumbed together into three (3) separate header pipes. Each header pipe penetrated the outer block wall of the building prior to being plumbed up to the roof and into their respective high suction fans. All lateral plumbing was installed sloping back to the extraction wells to prevent condensation from accumulating in the pipe. All condensation will drain back into the ground below the structural slab.

Each of the three high-suction extraction fans have been securely mounted to a custom fabricated steel channel strut bracing directly fastened to the roof. Each fan is powered from a sub-metered electrical panel with dedicated circuit breakers. All labor and materials associated with electrical work was conducted by a certified electrical contractor licensed in the county of Westchester NY.

Along each of the three main header pipes, a pressure switch and indicator light have been installed to display when a fan is no longer drawing a vacuum over 0.25 inches of water column. Each indicator light is visible for building maintenance staff to monitor.

3.2 Final Installation Photographs

Site: Former Magna Metals

Location: 315 Furnace Dock Rd.
Cortlandt Manor NY

Subject: High Suction Fan

Description: High suction fan mounted to custom bracing on roof with 10-foot high discharge. Power supply mounted to roof directly under fan bracing.

Site: Former Magna Metals

Location: 315 Furnace Dock Rd.
Cortlandt Manor NY

Subject: Header Pipe/Pressure Switch

Description: Extraction wells tied into header pipe. Pressure switch tied into header pipe.

Site: Former Magna Metals

Location: 315 Furnace Dock Rd.
Cortlandt Manor NY

Subject: Roof Conduit

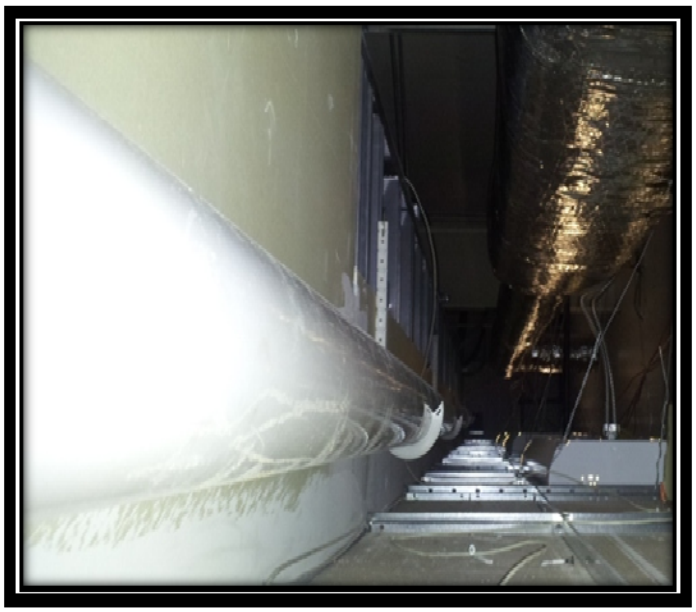
Description: Electrical rigid conduit mounted to roof with junction boxes and liquid tight fittings.

Site: Former Magna Metals

Location: 315 Furnace Dock Rd.
Cortlandt Manor NY

Subject: Pressure Switch Indicator Light

Description: Pressure switch indicator light mounted to wall for easy visibility. If the total vacuum from any of the fans falls below 0.25 inches of water column the indicator light will turn on.



Site: Former Magna Metals

Location: 315 Furnace Dock Rd.
Cortlandt Manor NY

Subject: Lateral Plumbing

Description: Piping installed above drop ceilings were hung on a slight pitch to allow for condensation to flow back to into the wells.

Site: Former Magna Metals

Location: 315 Furnace Dock Rd.
Cortlandt Manor NY

Subject: Exposed Lateral Pipe

Description: Pipe hung in areas of the building without drop ceilings was hung using threaded rod.

3.3 Post Installation Communication Testing and System Verification

Subsequent to installing the SSDS, Aztech allowed a total of ten (10) weeks for the system to be operable before mobilizing back to the site for a post installation sub-slab communications test. The communication tests conducted consisted of drilling a 3/8th inch hole through the structural slab at specific distances from each extraction well. A digital micro-manometer was inserted into the hole to measure the vacuum draw at each specific point. Results from each test are displayed in the table below. Influence of an area is acceptable when a minimum of 0.004 inches of water column is measured through a communication test hole in the slab.

Extraction Well	Distance From Well (ft)	Micro Manometer Reading (Inches of WC)
E	28	-0.075
E	54	-0.014
D	27	-0.035
A	35	-0.118

3.4 Post Installation Air Quality Sampling and Analysis

Indoor air quality samples were collected throughout the office space to confirm that the SSDS is effective in mitigating the contaminant infiltration from the office and loading dock portion of the building. Air sampling consisted of collecting 24-hour composite indoor ambient air samples from a total of three (3) locations inside the office area. Post installation samples were collected from the same locations and time of year as preceding samples. This provided similar conditions for an accurate comparison of the results. A duplicate sample was collected from one of the indoor sample locations and an outdoor sample was collected for analysis comparison. Samples were collected using stainless steel electropolished passive vessels also known as summa canisters. Samples were sent to Upstate Laboratories, Inc. to be analyzed for VOCs using EPA Method TO-15. The results of that analysis for the contaminant of concern (TCE) are listed below. Historical analysis results collected annually by other parties are also displayed. Analysis from the final sampling event on February 8th 2012 confirmed that the concentrations of TCE were below the detectable limits. Full analysis report can be found in **Appendix B.**

	Sample Location / TCE Concentration (µg/m³)		
Sample Date	**AI #1 / IA-12**	**AI #2 / IA-11**	**AI #3 / IA-10**
2/8/2012	ND	ND	ND
1/19/2011	5.1	3.5	2.3
1/19/2010	5.1	4.5	2
3/17/2009	4	3	2.4

3.5 Data Usability Summary Report (DUSR)

Analytical results were reviewed by Alpha Geoscience (Alpha) on March 28th 2012. A data usability summary report (DUSR) **(Appendix C)** was prepared by Alpha based on the data packages provided by the laboratory. The DUSR validated that the performances of the analyses were acceptable and fulfilled the requirements of the analytical method. Based on DUSR the lab data is considered usable and confirms that the SSDS is working to mitigate the TCE infiltration. This analysis also confirms that the SSDS is working to protect the health of those who occupy the office/laboratory portion of the building.

3.6 System O&M and Troubleshooting

In the event of a system shutdown due to a power outage, the SSDS fans will turn on automatically once power to the building has been restored. In the event of an indicator light displaying a loss in system vacuum please contact Aztech directly for additional support.

3.7 Conclusion

The objective of designing and installing an SSDS in the office/laboratory building at the Former Magna Metals site is to protect the human health of those occupying the structure. Post installation communication testing and laboratory analysis provide confirmation that the objective has been met. As a means to ensure that the SSDS continues to be protective of human health, the vacuum gauge indicator lights should be checked routinely to determine if the system is drawing vapors from below the structural slab. In the event of a loss in vacuum, an indicator light will illuminate. If necessary, Aztech can mobilize to the site to troubleshoot and resolve the issue. At the time of this report, the system is functioning properly and continues to serve its purpose of protecting the human health of the building occupants.